Nueces Agriculture

"IMPROVING FOOD & FIBER PRODUCTION"

VOLUME 14, ISSUE 1 *JANUARY 2021*

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TEXAS A&M AGRILIFE EXTENSION

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Happy New Year Nueces County! Certainly, we are all excited about the prospects a new year brings and we at the Nueces County Extension Office sincerely wish each of you a fabulous 2021!

We are kicking 2021 off with two banner programs I hope everyone will consider participating in. The first is the Field Crop Symposium on January 7th. This virtual program will give you the opportunity to earn up to 6 CEU from the comfort of your own home/office; but more importantly will provide area growers with some outstanding information on crop management issues as we move into the 2021 planting season. Because it is a virtual program you do have to register in advance in order to participate in the program. Registration details can be found within this newsletter. The second is the NCJLS Commercial Heifer Sale on January 8, 7pm at the RMB Fairgrounds. They will be selling 50 - 60 head of high quality replacement heifers raised by local 4-H and FFA youth in pens of 2 to 3 head. These heifers are all vaccinated, open, and have been vet checked for breeding soundness. The offering includes a broad range of bred types that will fit most any cattlemen's breeding program. So we hope to see you this week at either or both of these excellent programs.

This past fall we offered an outstanding beef cattle webinar series for area producers. If you missed it, fear not. Dr. Joe Pascale has done an excellent job of summarizing many of the topics addressed during the program in a group of articles he published in the "Beef Cattle Browsing" newsletter and I felt obliged to include several in this newsletter. As we wrapped up our fall Soil Testing Campaign we had an opportunity to look at the precision and accuracy of soil testing labs in Texas. Growers often question the soil test results they receive from labs across the state, with antidotal stories about wild variability between labs, so this fall we evaluated four commonly used labs here in our state. Also within this newsletter you can read our findings.

PRIVATE APPLICATOR TRAINING

When:..…… Tuesdays, 3/2, 6/1, 9/7, 12/7 **Pre-Registration Required……(361)767-5223**

Time …..……8:00 am—11:30 am **Where.……..…A&M AgriLife Ext. Office, 710 E. Main, Robstown, TX**

Fee: $50.00 (Includes study manuals)

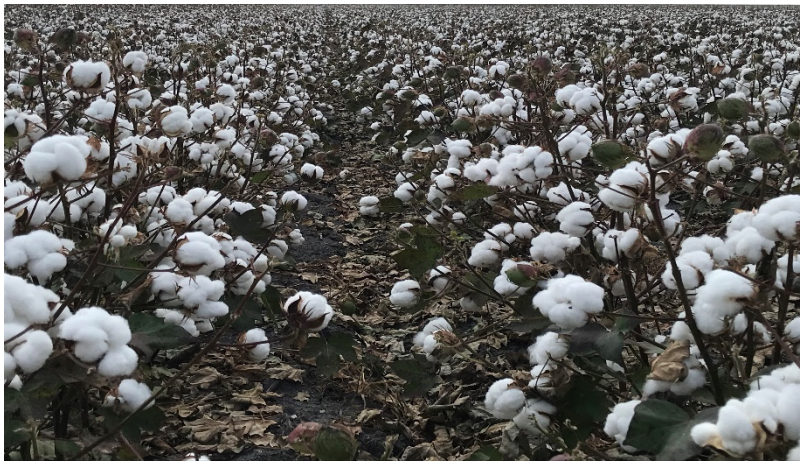
A Private Applicator is defined by law as a person who uses or supervises the use of a restricted-use or state-limited use pesticide for the purpose of producing an agricultural commodity.

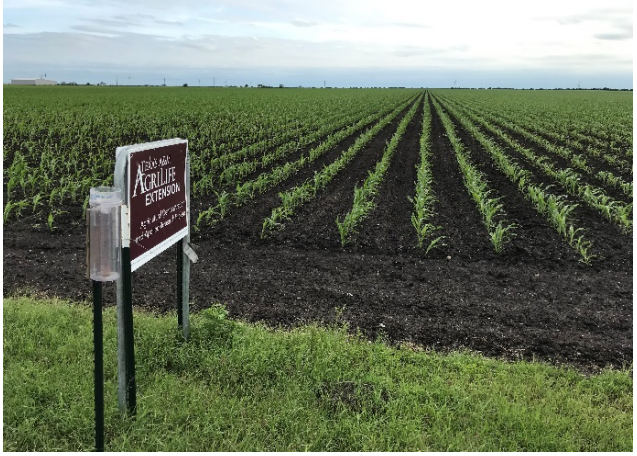
FARM WORKER PROTECTION SAFETY TRAINING

When…….Fridays, 2/5/, 5/7, 9/3 **Time ……..…….9:00 –11:00 am**

Where ……..Texas A&M AgriLife Extension Office

Pesticide handlers and workers must be trained <u>every year</u> unless they are certified applicators. All participants in this training will be issued cards verifying they have successfully completed the required training and given a copy of the sign-in roster for their employer's files.





Field Crop Symposium

January 7, 2021

8:45am - 2:50pm

7:45am – 8:45am, Optional Auxin Training

This virtual program will provide updates to Growers on Crop Management considerations for the 2021 growing season including: Weed Management with Sorghum Herbicide Technology, Delaying Onset of Weed Resistance, Pesticide Laws, Impacts of Fertility on Insects and Disease Pests, Bt Resistance in Bollworm and Viral Control Option. 5 CEUs with an optional 6th for Auxin Training have been requested. Cost of participation is $20 prior to January 5th.

RSVP REQUIRED TO: http://bit.ly/2021FieldCropSymp . For assistance or additional information please call 361.767.5223

Sire Contribution to Pregnancy Loss in Different Periods of Embryonic and Fetal Development of Beef Cows

Beef Cattle Browsing— December 2020

Pregnancy loss is a major cause of reproductive failure in cattle. Early embryonic mortality (EEM) is defined as pregnancy losses between the time of insemination (D 0) or embryo transfer (D 7) and 28-30 days of gestation. Late embryonic mortality (LEM) are losses occurring between days 30 and 60 of gestation. EEM, including fertilization failure, which occurs in about 28% of single inseminations in beef cattle, and embryo elongation and maternal recognition of pregnancy. In beef cows, EEM ranges from 34 – 62%, averaging 48%, while LEM ranges from 2 – 10%. About 16% of EEM occurs between D 20 and D 30 of gestation, the embryo implantation period.

Paternal genetics contribute to pregnancy establishment and maintenance, specifically placental formation. A properly formed placenta is required for exchange of nutrients. Pregnancy associated glycoprotein (PAG) are secreted by the placenta and are used in commercial blood tests to determine pregnancy in as early as 28 days. Previous research has shown that PAG levels are influenced by the sire. The objective of this study was to evaluate the effects of service sire on pregnancy loss during different periods of early embryonic development.

Multiparous (n=485) and primiparous (n=173) Angus cows were synchronized using the 7-day Co – Synch + CIDR program and inseminated via timed AI. Females were detected in estrus using Estrotect ® patches. Estrus intensity (not in estrus or low estrus versus high estrus intensity) was determined from patch evaluation score at breeding. Females without a patch were removed from the study.

Cows were randomly inseminated with fertile semen from one of eight Angus sires to assess the sire impact on pregnancy loss. Pregnancy was determined 1) at D 24 by increased circulation of PAG on D 24 compared to D 0, and 2) by ultrasound on D 31 and D 60. After D 60, cows were divided into four groups:

1. Pregnant (pregnancy established and maintained until D 60)
2. EEM (pregnancy loss between D 24 and 31 of gestation)
3. LEM (pregnancy loss between D 31 and 60 of gestation)
4. Not pregnant (no elevated PAG at D 24 and no embryo at D 31)

Overall pregnancy rate on D 24 was 54.9% and pregnancy loss (pregnant at D 24 but not pregnant at D 31) was 5.5%. There were no differences due to parity of cow. On D 31 pregnancy rate was 51.8% and pregnancy loss between D 31 and D 60 was 6.7%. Again, there were no differences due to parity of cow.

Pregnancy rates by sire at D 24 were not significantly different and ranged from 47 – 63%. Sires were then classified by percentage of pregnancy loss occurring between D 24 and 31 of gestation. Four sires accounted for 75% of the EEM (High EEM, average loss 8.9%). The other four accounted for the remaining 25% (Low EEM, average loss 2.6%). Cows inseminated with semen from High EEM sires were 3.7 times as likely to have a pregnancy loss between D 24 and 31 of gestation. No differences were observed in PAG levels between the High and Low sires.

Pregnancy rate was similar for all sires at D 31 (44 – 61%) however three sires accounted for 74% of the embryonic mortality between D 31 and 60 of gestation (avg. 11%) while the other five sires accounted for 26% (avg. 3.2%). Once again cows bred to High LEM sires were 3.7 times as likely to experience a pregnancy loss but this time between D 31 and 60 of gestation and again no differences were observed in PAG levels between the High and Low sires.

Estrus expression did influence pregnancy status. Cows that expressed estrus had a significantly higher pregnancy rate at D 24 (63 vs. 48%) but similar pregnancy loss between D 24 and 31 compared to those that did not express estrus (4.3 vs. 6.8%). Moreover, estrus expression had a positive impact on both Low and High EEM sires (17 and 14%, resp.) indicating that exhibiting estrus had a positive impact on reducing EEM.

Cows expressing estrus again had a significantly higher pregnancy rate at D 31 (61 vs. 45%) but similar pregnancy losses between D 31 and 60 (8.3 vs. 6.2%) than those that did not express estrus. However, cows in estrus bred to Low LEM sires had significantly greater increase in pregnancy rate a D 31 (23%) compared to cows in estrus bred to High LEM sires (7%), again indicating the positive effect of estrus on reducing LEM.

Even when bulls pass all standard semen evaluations, there is still much variation in pregnancy rate and pregnancy loss that cannot be explained by visual semen analysis. Since embryonic losses occur over a span of 60 days in this study, an assessment of sire fertility based on a single pregnancy check may not be an accurate assessment. Development of markers to identify sires that are associated with high or low embryonic losses would be beneficial.

Soil Testing Laboratory Evaluation

Texas A&M AgriLife Extension Service
Nueces County, 2020

Authors: J.P. Ott

Summary

This test evaluated the accuracy and precision of four commonly used soil testing labs in Texas in providing estimates of soil fertility values using a Victoria Clay soil collected in Nueces County. While significant differences in the reported values from lab to lab were observed ($p \leq 0.05$), without an in-field study of varying fertilizer rates in the coming crop year, true accuracy of the reported soil fertility values cannot be determined. Considering all the variability that is inherent in soil testing, based on the descriptive statistics from this data set, the accuracy of the reported fertility values appears decent. Perhaps most importantly the precision of each individual lab appears to be very good. Growers should have little uncertainty regarding the results provided to them when using any of the labs in this study.

Objective

Growers often question the soil test results they receive from soil testing labs across the state. Generally, measurements cannot be exact, therefore they become "estimates" and will contain a certain element of bias. Bias can be introduced by the grower in the collection process or by the lab in how the nutrients are extracted from the soil and what method is used to analyze the nutrients. Secondly, individual labs may have a different basis for what they recommend based on both the measured nutrient value and your goals. This level of variability leads some growers to question the value of this recommended practice. Therefore, our objective was to evaluate the precision and accuracy of four commonly used soil testing labs in Texas. Accuracy is the closeness of the measure to the true value. Precision is the closeness of repeated measures or estimates.

Materials and Methods

The precision and accuracy of 4 commonly used soil testing labs in Texas was evaluated after the 2020 growing season using a Victoria Clay soil collected from a producer's farm in Nueces County. Approximately 5 gallons of soil was collected on November 12 from a single location within a field that had previously been fallowed at a 0 to 2-inch depth. The collected soil was placed in a clean plastic bucket.

The collected soil was placed on a tarp and completely mixed by hand, any clods were broken down or removed on November 16. The soil was thoroughly mixed again on November 18 with every effort made to ensure the collected soil was homogenous and any collection bias removed before it was divided equally into 16 separate samples and placed into individual soil sample bags. The 16 samples

were then randomly grouped into 4 groups of 4. Each group was then assigned a number to identify each sample group. One sample from each group was then randomly selected and placed together for submittal to one of four soil testing labs. The samples were mailed via USPS to their respective labs on November 20.

The Texas A&M AgriLife Extension Service Soil, Water, and Forage Testing Laboratory (TAMU) uses the Mehlich III extractant. For this reason, the Mehlich III test was requested from all labs receiving these samples; though many commercial soil testing labs offer several options as to how your sample can be extracted and analyzed.

Results and Discussion

Table 1. Comparison of pH, nitrogen, phosphorus, and potassium between soil testing laboratories.

Lab	pH	-------ppm-------		
		N	P	K
TAMU	7.7	18	53	841
Lab A	8.2	20	56	943
Lab B*	7.3	3	46	700
Lab C	8.2	6	51	831
Mean	7.8	11.4	51.4	828.8
C.V.	1.52	10.38	7.03	2.68
L.S.D. 0.05	0.19	1.9	5.8	35.6

*Potassium values not provided when more than 700 ppm by Lab B.

The data table (Table 1) below provide comparison of data on pH, nitrogen, phosphorus, and potassium between soil testing laboratories. Based on the average mean of the labs used in this study it is estimated that the likely pH of the soil was 7.8 $\pm$ 0.2 ($p \leq 0.05$). For nitrogen and phosphorus, the average means were 11.4 $\pm$ 4.2 and 51.4 $\pm$ 2.7 ppm, respectively ($p \leq 0.05$). For potassium, an average mean of 828.8 $\pm$ 48.8 ppm ($p \leq 0.05$) was calculated using a value of 700 ppm for Lab C. Lab C does not provide a potassium value when the detected level is more than 700 ppm which therefore lowered the average mean for potassium.

There is a prominent numeric separation between the nitrogen values provided by TAMU and Lab A and Labs B and C; although all were significantly different ($p \leq 0.05$) from one another (Table 1). Table 2 shows the average, range, and confidence interval of the 4 samples sent to each soil testing laboratories. At TAMU the average nitrogen value was 18 $\pm$ 0.8 ppm with a range of 1 ppm (Table 2), which is similar to the Lab A average of 20 $\pm$ 2.3 ppm with a range of 3.5 ppm. Lab B and C averaged 3 $\pm$ 0.9 ppm and 6 $\pm$ 2.1 ppm, respectively, with ranges of 1 and 3 ppm ($p \leq 0.05$) and were distinctly lower than TAMU and Lab A.

A clear difference between the laboratories that received soil samples was the time it took each lab to return test results. Lab A was 7 days ahead of TAMU in reporting results. TAMU provided soils reports on December 2. Results were not received from Labs B and C until prompted on December 14. While a true correlation between time taken to receive test results and reported nitrogen values is not expected, it is interesting that the two early labs reported much higher nitrogen levels than the latter two.

In the case of phosphorus, reported lab values were more uniform across all four labs with no statistical difference ($p \leq 0.05$) among the reported values for TAMU, Lab A, and Lab C (Table 1). However, Lab B statistical differed from TAMU and Lab A ($p \leq 0.05$).

For potassium we once again see more separation between reported values by the individual laboratories (Table 1). For Lab B this is clearly explained by their reporting method which was previously mentioned. Although, Lab A also statistically differed ($p \leq 0.05$) from TAMU and Lab C.

Though statistical differences exist between laboratories, each individual laboratory has demonstrated their ability to repeatedly measure the nutrient value of the soil provided with very good consistency. The range between the highest and lowest measured values for each individual laboratory is very low (Table 2).

Table 2. Comparison of Mean, Range, and Confidence Interval between soil testing laboratories.

Statistics	TAMU	Lab A	Lab B*	Lab C
		----pH----		
Average	7.7	8.2	7.3	8.2
Range	0.20	0.17	0.50	0.02
C.I. 0.05	0.15	0.13	0.38	0.02
		----Nitrogen----		
Average (ppm)	18	20	3	6
Range	1	4	1	3
C.I. 0.05	0.8	2.3	0.9	2.1
		----Phosphorous----		
Average (ppm)	53	56	46	51
Range	5	12	7	5
C.I. 0.05	3.4	9.0	4.9	3.5
		----Potassium----		
Average (ppm)	841	943	700	831
Range	34	58	0	83
C.I. 0.05	24.7	42.7	0.0	54.6

*Potassium values not provided when more than 700 ppm by Lab B.

Conclusions

While there were significant differences in the reported values from lab to lab, the accuracy of the reported values appears decent. A fertility test using varying fertilizer rates would be required to determine true accuracy of the reported soil fertility values.

More importantly the precision of each individual lab appears to be very good. Therefore, there would be no hesitation in supporting a grower's decision to use any of the labs included in this study. And while growers should have little uncertainty regarding the results provided to them when using any of the labs in this study; remember that the second component of soil test results are the fertilizer recommendations based on the measured nutrient findings provided by the labs.

Fertilizer recommendations from the individual laboratories were not reported here as our interest was on soil testing results and not on recommendations, which would require field studies to validate over multiple growing seasons. Individual labs may have a different basis for what they recommend based on both the measured nutrient value and your goals. Before selecting a lab to submit samples to determine if their recommendation philosophy is to provide the nutrients needed for the current crop year or for increasing background residual fertility. Either could be appropriate for an individual producer's needs.

Acknowledgements

The support of the Nueces County Crops Committee and Field Crop Taskforce who provided the funding to pay soil testing fees is appreciated. Special thanks to J.R. Cantu, Nueces County Demonstration Assistant, for assisting with the collection and preparation of samples.

Cost of Pregnancy Loss in Cattle

Beef Cattle Browsing—December 2020

In a recent multicounty webinar series titled "Show Me the Money", speakers addressed the topic of value and cost of lost pregnancies. Pregnancy rates determined at pregnancy checks are usually higher than number of calves born. Some of these losses can be attributed to disease or genetics but such losses increase the breakeven price of the remaining calves.

One of the speakers was Stan Bevers, a Texas A&M AgriLife Extension Agricultural Economist Emeritus, who has conducted Standardized Performance Analysis for 350 herds from Texas to Montana. Now as a professional ranching consultant Stan runs Ranch KPI (Key Performance Indicators) https://www.ranchkpi.com/ and is a faculty member with King Ranch Institute of Ranch Management.

Stan reported average annual cow cost of 31 herds in Texas and across the US averaging 1624 head as $956.67. In addition, average pregnancy rate was 90% but calving rate averaged 82.7%, indicating 7.3% pregnancy loss after cows were determined to be safely in calf. Of calves born, 80.2% were weaned (another loss of 2.5% after calving). Average weaning weight of those calves was 561 lbs. and were valued at $161.04/cwt. but the breakeven cost (at weaning) was $207.81.

Stan said that just selling open cows as culls is an expensive and wasteful solution. Open cows do not increase expenses, they remain the about the same. If culled, direct expenses (feed, veterinary, etc.) are reduced but indirect costs (labor, taxes, insurance, repairs, deprecation, etc.) remain the same. When a cow is sold, you are selling a fixed asset. You will have fewer weaned calves to sell and that increases the breakeven of the remaining weaned calves.

Editor's note: Sales of cull cows (open, old, or less productive cows) represent about 15% of ranch income. Cull cows should be marketed in good condition to maximize weight and price.

Research Takes on Plastic Contamination in Cotton

Ron Smith, December 28, 2020

Plastic contamination diminishes the value and damages the reputation of U.S. cotton.

"Plastic contamination results in a loss in premium," says John Wanjura, USDA-ARS agricultural engineer at the Lubbock, Texas, USDA-ARS Cotton Production and Processing Research Unit. Wanjura, speaking to the annual Texas Plant Protection Association annual conference via Zoom connection due to Covid-19 precautions, said mills are becoming reluctant to buy U.S. cotton because of an increase in plastic contamination. "We've seen an erosion of premiums for U.S. cotton. Mills do not want to handle that contaminated material." He said lost premium costs producers as much as 7 cents a pound as it trades below equivalent grades from competing cotton-producing countries. "That equates to about a $700 million in lost revenue to the U.S. cotton industry for the 2019/2020 crop, about 20.5 million bales." He said other losses include CCC loan discounts.

The U.S. reputation for quality is also at stake. "Those bales of 71 and 72 calls (plastic contamination codes) just won't be purchased by a merchant. There's not much of a home for them. We can't afford a significant market share loss and a loss of markets overseas to our customers.

So, what do we do about it? USDA-ARS has a lot of work going on here at Lubbock and gin labs in Stoneville, Mississippi, and in Las Cruces, New Mexico, looking at various technologies to help detect and remove plastic from the cotton in the ginning process." He said research also continues through the Cotton Structure and Quality Research unit in New Orleans and Texas A&M Department of Biological and Agricultural Engineering. He said Cotton Incorporated "is helping to lead a lot of research with funding and technical support." Industry partners include Lummus and Bratney Companies.

"We've had some success," Wanjura said. He cited monitoring systems that detect plastic at various points in the ginning cycle and systems that detect and remove plastic. "We've developed a monitoring system to detect and eject plastic in the gin. Another machine, the Golden Lion, currently available from a Chinese company, "is a passive type machine folks at the Las Cruces lab are working on." The Las Cruces lab is also looking at a system that passively removes plastic as it's flowing through the conveyance lines.

We're developing a wrap material performance standard through the American Society of Agricultural and Biological Engineers (ASABE)." He said that standard will apply to the current wrap materials as well as new products coming on the market in the future.

Wanjura explained that the module feeder inspection system relies on cameras installed to identify buildup on the rollers, so operators can stop and remove the material. "The longer that material stays on, the greater the potential for contamination. We've made modifications to this system in the last couple of years to make the camera mounts more generalized, depending on pit design." He said an algorithm built into software automatically detects plastic accumulation on the rollers and alerts the ginner to remove that material.

"Also, we've integrated additional camera technology to our RFID scanning system to monitor the unloading and unwrapping of modules to help diagnose potential contamination. "Cameras mounted on the truck end of the module feeder record every unloading event to capture any mishaps during the unwrapping process. For every module processed we can see what may have caused a contamination event." Wanjura said work over the past few years includes systems that identify colors during the ginning process to detect contamination. "Once the system sees that material, it fires a set of solenoids at the base of the apron and blows air out over about an 8 to 10 inch width to eject the contaminants."

He said design challenges include the ability to differentiate colored contaminants from natural cotton colors. "Pink and yellow module wraps overlap the 'natural color space' of cotton as equipment tries to detect differences in the cotton versus the plastic." The thickness of the plastic also makes a difference in ease of removal. "It's easier to get rid of bigger or multi-layer plastic," Wanjura said. "If the plastic comes apart off the module, it's harder to get the single layer of material out than it is the multi-layer material." He said this system is commercialized and installed in several commercial gins, one on the High Plains. "In that location, we see pretty consistent results, almost 90% detection and ejection and efficiency across all of those different colors of module wrap." He said Cotton Incorporated purchased one of the Chinese machines and installed it at the ginning lab in Las Cruces. "[Manufacturers] claim it has over an 80% capability to remove plastic in flowing seed cotton. The results we've seen is closer to 60%." He said this machine uses a combination of mechanical and pneumatics to remove plastic. "It blows cotton up into the chamber and the plastic is supposed to stick to the drum, but with this design, the airflow rate was not high enough to get anything to stick to that drum. So, we modified things, increased the airflow and the collection efficiency. After the improvements, we see increased efficiency."

He said a thermal concept for removing plastic also shows promise. "At about 100 degrees Celsius, or 210 degrees Fahrenheit, plastic will melt and adhere to a metal surface. The idea is to heat up the surface plastic flows over and capture some of the plastic. Once adhered to the metal surface, the plastic is scraped off by a knife on the backside of the drum."

Wanjura said addressing the plastic contamination issue must be a collaborative and multi-pronged approach that includes in-field monitoring and tracking, as well as monitoring, detecting and eliminating plastic in the ginning process.

Effect of Hay Feeding Method on Cow Performance, Hay Waste, and Wintering Cost

Beef Cattle Browsing—December 2020

Winter feed costs are a significant portion of costs for most ranchers. A 3-year research project evaluated differences in hay feeding method on cow wintering cost. Bales were either rolled out on the ground, shredded and fed on the ground, or fed in a tapered cone feeder. A total of 360 crossbred cows weighing an average of 1342 lbs. was randomly assigned to one of twelve 4.5-acre traps (3 treatments, 4 replications) during the three years (January – February). Cows were weighed, body condition scored (BCS), and ultrasonically measured for rib fat at the start and end of the 59-d study. Bale weight was recorded and sampled for quality. Alfalfa-bromegrass-crested wheatgrass hay was offered in the first 2 years, oat hay was offered in the third year. Dry matter intake was predicted using NRC formulas. Hay waste was measured.

Cows were fed to maintain or improve their starting body condition prior to calving. There was no interaction between treatment and years (method of feeding or hay type). Cows fed bales unrolled on the ground gained significantly less than cows fed shredded hay in cone feeders. Waste increased amounts of hay fed to the unrolled and shredded hay groups. Hay waste in the cone fed groups was 4.3 to 5 times **less** than the unrolled or shredded groups. An economic analysis showed that feeding with a tapered cone round bale feeder offered substantial feed cost savings per cow primarily in reduced (5.0 to 15.3%) amount of hay fed to maintain the same body condition of the cows.

Editor's note: Winter feeding of hay is expensive (about 15% of all cow costs) and feeding methods that are wasteful should be avoided to minimize that loss. Most studies have shown that any form of feeding that keeps cows from walking, lying, or defecating on hay will reduce hay feeding losses and reduce cost.

Generation Next: Our Turn to Ranch

Online Ag Business Start-up School

The Generation Next curriculum targets new landowners, those who are inheriting land, or those who are looking to start a new agricultural operation on an existing ranch. It is taught as an online school where participants will work towards developing a business plan with plenty of support from professionals who specialize in each field and topic.

Course Includes: 12 online classes of expert instruction with a complete business plan by the end of the course, and a Generation Next t-shirt and certificate.

Topics covered:

- How to start an agricultural business
- Understanding business taxes
- Insurance needs for your ranch
- Tracking your finances
- Evaluating your land resources
- How to set up grazing and wildlife management leases
- Basic ranch laws – fencing, water, etc.
- Land management techniques
- Alternative operations & direct marketing
- Setting goals with measurable objectives for success

Texas A&M AgriLife Extension

GENERATION NEXT Our Turn to Ranch

NEXT ONLINE CLASS:

JAN. 25—APRIL 18, 2021

The course will require approximately 2 hours of your time (at any time!) per week, for 12 weeks. You only need access to a computer with internet capabilities.

Registration Fee: $250
Register at:
https://agrilifelearn.tamu.edu/product?catalog=ESSM-001

For more information contact:
Dr. Megan Clayton
megan.clayton@ag.tamu.edu
361-265-9203
https://generationnext.tamu.edu

Mineral Imbalances Need to be Considered in Cattle Deaths

AGRILIFE TODAY, DECEMBER 4, 2020

Ranchers need to keep in mind that the wrong quantities of minerals can be dangerous or even deadly to cattle, said experts from the Texas A&M AgriLife Extension Service.

When it comes to cattle and minerals, what works for a rancher 700 miles away may actually work better for you than what works for a neighbor 7 miles down the road; it all depends on what is in your soil, supplements, feed, forage and water supply. "There is no one-size-fits-all approach to minerals," stressed Joe Paschal, Ph.D., AgriLife Extension livestock specialist, Corpus Christi. "What works for your neighbor's cattle won't necessarily work for you. There are a lot of factors producers must take into consideration."

"Proper livestock nutrition is a key factor in your cattle's health and productivity," added Thomas Hairgrove, DVM, Ph.D., AgriLife Extension cattle veterinary specialist in the Texas A&M University Department of Animal Science. "Knowledge of your herd's mineral status is fundamental to developing an optimal herd health program." The key to understanding individual needs centers on the total nutrition of the herd. For example, diets high in protein and/or potassium or low-carbohydrate diets can impair magnesium absorption, said Hairgrove. He said zinc and copper need to be absorbed in a specific ratio. Excess zinc reduces the amount of copper absorbed and excess iron or sulfur can interfere with absorption of other minerals. "In other words, an excess or deficiency of one mineral affects how other minerals function in the animal," said Hairgrove. Sometimes, he said, extreme cases can lead to death in a herd. So, what happens when you find a dead cow, or multiple dead cows over a period of a few months or a year? Hairgrove and Paschal hope Texas producers and veterinarians realize AgriLife Extension offers an invaluable resource.

"In Burleson County we had a producer who had almost 20 head of cattle die over a period of a year," said John Grange, AgriLife Extension agent for Burleson County. "This was an older producer in his 90s and when his son became aware of the situation, they consulted their local veterinarian." The veterinarian was having trouble diagnosing the issue, so she contacted Texas A&M AgriLife. Grange said once he, Paschal and Hairgrove put their heads together, they decided to conduct several tests to rule out possible causes. "Working as a team, we conducted tests on hay, forage, soil and water samples," he said. "Dr. Hairgrove also pulled blood and urine samples on the cattle. This case showed the importance of how strong the Texas A&M AgriLife Extension Service is and how, together, we were able to help our producer."

Grange said they were able to rule out many common issues and get to the core problem for the producer and that by utilizing the entire team not only were they able to help this producer, but ultimately aid in another local case as well.

The Burleson County producer found most of the animals observed experienced a sudden death in the pasture. The few animals observed appeared to exhibit grass tetany signs, which are usually associated with magnesium deficiency.

Taking tissue samples from cattle is one of the ways to test the overall health of a herd and to determine any mineral deficiencies they may have. Urine and blood samples were taken from 10 cows and submitted to the Texas Veterinary Medical Diagnostic Laboratory to determine mineral status. These indicated only a low serum copper status, which would not cause sudden death. Magnesium deficiency cannot always be evaluated from urine or blood. The most sensitive and practical test to determine the animal's magnesium status and predict supplementation value requires measuring urinary creatinine and magnesium. Further testing indicated these cattle were deficient in magnesium in their diet. These cows were determined to be also deficient in selenium, as shown in alternate testing strategies.

Analysis of soil, forage and water confirmed the deficient dietary status of this herd. Protein, energy and mineral supplementation based on forage, water and soil analysis began, and follow up with the owner indicates no more death loss.

"It is never as simple as putting out a mineral block and assuming that it will meet your cattle's needs," stressed Hairgrove. "This producer's mineral supplementation consisted of white salt, yellow salt and trace mineral block, yet the deaths of 20 animals appear related to their mineral status."

Hairgrove said the take-home message is to work with your local veterinarian and AgriLife Extension county agents to interpret laboratory results relative to your cattle's body condition, forage and water quality, and potential for disease ortoxic plants.

Hairgrove and Paschal both recall other memorable cases over the past year scattered across the state. A novel case involves bison in Upshur County.

"When the producers first came in my office about their dying bison, I didn't have a clue about bison," said Kaitlyn Slover, AgriLife Extension agent for Upshur County. "I quickly called my regional program leader, Larry Pierce, and he pointed me in the direction of Dr. Hairgrove."

Bison are known to have issues with internal parasites, especially with high-density stocking. After speaking with Hairgrove, Slover determined she needed to collect fecal samples to determine if internal parasitism was the cause of the deaths. Internal parasites were present, but the results of three necropsies indicated a severe mineral imbalance with high zinc and low copper liver levels.

"We also ran soil samples, water samples, forage samples and hay samples," she said. "Through all these tests, we were able to confirm the bison were suffering from high zinc and low copper levels."

They also consulted with Jason Banta, Ph.D., AgriLife Extension beef cattle specialist in Overton, on feed, minerals and hay. They were ultimately able to come up with a plan for the producers.

"Trying to find research on bison was our biggest struggle; that's why the applied research we have started will be so vital to the industry as a whole," said Slover. Through her research and work with Hairgrove, she has learned more about bison than she ever thought possible. For example, bison require much more "bunk space" – more feed and mineral troughs. "You can't provide feed and minerals to bison in the same manner you would for cattle," Hairgrove explained. "Their social structure is different from domestic cattle." Although cattle and bison belong to the

same family, Bovidae, and share a distant ancestor, their nutrition and health needs are not the same.

“Everyone hates to hear about animals dying, but the research that we have been able to conduct because of these deaths will prove to be important for other producers worldwide for years to come,” Slover said.

In Anderson County, a producer lost four cows over about a year. This was concerning because the cattle were not old and didn’t have any apparent health issues. The producer contacted the local AgriLife Extension office in an effort to find aid in determining the possible causes of death.

“Within Texas A&M AgriLife we are lucky to have good resources to help with situations like this,” said Truman Lamb, AgriLife Extension agent for Anderson County, who pulled together a team to help solve his stakeholder’s problem.

Joining Lamb were an AgriLife Extension veterinarian, an AgriLife Extension beef cattle nutritionist and private veterinarians. After looking at and ruling out a range of possibilities and evaluating tissue samples, it was determined that the cattle most likely died of copper toxicity. “Unfortunately, trace mineral toxicity is becoming more common especially when producers feed multiple supplements with added trace minerals or use drenches or injectable mineral products in addition to a well-formulated mineral supplement,” said Lamb. “It is important to provide a mineral supplement, but you don’t want to overdo it as that can lead to additional problems.”

Lamb said his Anderson County case was a perfect example of how producers, AgriLife Extension personnel and private practice veterinarians can work together can help solve and prevent future problems.

“The reality is there is a lot of cropland that has been turned into pasture that is very low in soil mineral, not just nitrogen, phosphorus or potassium, but many of other soil minerals too,” said Paschal. “Before putting animals out to graze on a new location, a little soil and water testing and forage analysis can go a long way. If you know what you are working with in advance, it will really be to your animals’ benefit.”

Between AgriLife Extension, Texas A&M AgriLife, Texas A&M AgriLife Research, Texas A&M Veterinary Medical Diagnostic Laboratory and the rest of the extensive Texas A&M network, nearly any question a stakeholder has can be answered and any test that needs to be run can be done.

“We want producers to be aware that no matter where in Texas they live, there’s an AgriLife Extension county agent they can call for help,” said Grange. “We encourage ranchers to call us first when they have a problem, not last. Even if we do not know the answer, the access and resources available to us are extensive and we will know how to find the AgriLife expert who can provide the answer.”

Paschal added that “Dr. Google” doesn’t have the answers and should not be considered a reliable source and that a little testing, common sense, and best management practices can go a long way in stopping preventable deaths.

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